



## **BS 5126:Part 1:1974**

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621.316.717

### **Specification for Mining type flameproof supply and control units for use on systems up to 1100 V**

**Part 1.160/250 A direct-on-line motor starters  
(for use on three-phase a.c. circuits)**

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The following BSI references relate to the work on this standard:  
Committee reference MQE/16 Draft for comment 73/42750

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The Mining and Quarrying Requisites Industry Standards Committee, under whose supervision this British Standard was prepared, consists of representatives from the following Government department and scientific and industrial organizations:

- |                                                            |                                            |
|------------------------------------------------------------|--------------------------------------------|
| *Association of Mining Electrical and Mechanical Engineers | Institute of Quarrying                     |
| *British Electrical and Allied Manufacturers' Association  | Institution of Mechanical Engineers        |
| British Steel Industry                                     | Institution of Mining Engineers            |
| *Council of Underground Machinery Manufacturers            | Mechanical Handling Engineers' Association |
| *Department of Trade and Industry                          | *National Coal Board                       |
| Engineering Equipment Users' Association                   |                                            |

The Government department and industrial organizations marked with an asterisk in the above list were directly represented on the committee entrusted with the preparation of this British Standard.

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# BS 5126:Part 1:1974

## Contents

|                                                                    | page               |                                            | Page |
|--------------------------------------------------------------------|--------------------|--------------------------------------------|------|
| Co-operating organizations                                         | Inside front cover |                                            |      |
| Foreword                                                           | 2                  | <b>Appendix</b>                            |      |
|                                                                    |                    | A. Metric/imperial equivalents             | 12   |
| <b>Specification</b>                                               |                    | <b>Figures</b>                             |      |
| 1. Scope                                                           | 3                  | 1. Busbar chamber end flange               | 13   |
| 2. References                                                      | 3                  | 2. Busbar end cover                        | 14   |
| 3. Definitions                                                     | 3                  | 3. Busbar interconnecting trunk            | 15   |
| 4. Service conditions                                              | 4                  | 4. Skid coupling                           | 16   |
| 5. Rated values                                                    | 4                  | 5. 650/1100 V skid coupling plate          | 17   |
| 6. Marking                                                         | 4                  | 6. 650/1100 V busbar interconnecting trunk | 17   |
| 7. Design and construction                                         | 5                  | 7. Typical padlock                         | 18   |
| 8. Tests                                                           | 9                  |                                            |      |
| 9. Information to be supplied to the manufacturer with the enquiry | 11                 |                                            |      |

## Foreword

This British Standard has been prepared, under the authority of the Mining and Quarrying Requisites Industry Standards Committee, as part of a programme to standardize the main features of 1100 V mining type flameproof supply and control units (commonly known in the United Kingdom as 'gate-end boxes') which are now being used more widely in coal mines in the United Kingdom. The standard is presented in metric units but follows the general pattern of BS 787 'Mining type flameproof gate-end boxes for systems up to 650 V' and, similarly, it is to be published in several parts.

This first Part covers control units in which the essential apparatus is an electrically operated contactor and associated equipment, which together provide control and protection facilities primarily for coalface machinery.

It is envisaged that additional Parts of this standard will feature circuit breakers, lighting units and drill units, all having standard busbar and other fixing dimensions, enabling the different units to be fastened together to form a switchboard.

This standard is arranged to be in close alignment with IEC criteria for various electrical features.

NOTE. The conversions to imperial units quoted for reference in Appendix A are approximate. More accurate conversions should be based on the tables in BS 350 'Conversion factors and tables' Part 1 'Basis of tables, Conversion factors'.

# British Standard Specification for Mining type flameproof supply and control units for use on systems up to 1100 V

Part 1.160/250 A direct-on-line motor starters  
(for use on three-phase a.c. circuits)

## 1. Scope

This Part of this British Standard specifies requirements for flameproof supply and control units (gate-end boxes) designed primarily for use, in the coal mining industry, on 1100 V three-phase a.c. circuits, for direct-on-line contactor starting and for the protection of coal-getting, conveying and similar machinery. Provision is also made for operation on other voltages, where required, particularly on 550 V.

## 2. References

The titles of the British Standards referred to in this standard are listed on the inside back cover.

## 3. Definitions

For the purposes of this British Standard the following definitions apply.

**3.1 supply and control unit (gate-end box).** A flameproof enclosure containing electrical apparatus, such as transformer, control gear, switchgear and/or protective gear, designed primarily for use underground.

**NOTE.** For the purposes of this Part of the standard, the apparatus is essentially an electrically operated contactor with associated equipment to provide control and protection for coalface machinery.

**3.2 isolator.** A mechanical device capable of opening or closing a circuit, under conditions of no-load or negligible current.

**3.3 isolating switch.** A switch which isolates a circuit and is capable of breaking not less than its rated current at rated voltage.

**3.4 contactor.** A device suitable for repeatedly opening and closing the circuits of electrical apparatus; it functions electro-magnetically, the speed of make and of break being independent of the operator.

**3.5 cable coupling unit (flit plug).** A detachable cable sealing box utilizing contact tubes and pins to facilitate ready connection to, or disconnection from, a similar unit or other apparatus.

**3.6 cable coupler adaptor.** A device used to connect a cable coupling unit to apparatus. It may either be separate from or be integral with the enclosure of the apparatus to which the cable coupling unit is to be connected.

For the purposes of this standard, the term 'adaptor' also includes the unit to connect other types of cable terminations to apparatus.

**3.7 cable sealing box.** A closed box to which a cable can be attached by means of a gland and which is designed to be filled with insulating compound to protect the insulation of the cable from air or moisture.

**3.8 detachable cable sealing box.** A cable sealing box which can be disconnected and detached from associated apparatus without disturbing the sealing of the cable.

**3.9 flameproof enclosure.** An enclosure for electrical apparatus that will withstand an internal explosion of the flammable gas or vapour which may enter it, without suffering damage and without communicating the internal flammation to the external flammable gas or vapour for which it is designed through any joints or structural openings in the enclosure.

**3.10 rating.** The value assigned by the maker to some limitations of performance under certain specified conditions known as the 'rated conditions'.

**3.11 restrained plug and socket.** A plug and socket in which the two portions are engaged, retained and disengaged by means of a manually operated device.

**3.12 bolted cable plug and socket.** A plug and socket designed to be held together by two or more bolts or screws, or studs and nuts in such a way that the plug and socket cannot be disengaged without the use of a tool.

# BS 5126:Part 1:1974

**3.13 intrinsically safe circuit.** A circuit in which any spark or thermal effect produced either normally or in specified fault conditions is incapable, under prescribed test conditions, of causing ignition of a given gas or vapour. (See 8.2.6.)

**3.14 local control.** Control by means of a manually operated switch or push button integral with the control unit.

**3.15 remote control.** Control by means of a manually operated switch or push button located at a point separate from the control unit.

**3.16 automatic control.** Control by means of any device other than a manually operated switch or push button.

**3.17 sequence interlocking.** Means by which operation is made dependent on the fulfilment of other prescribed conditions.

**3.18 overcurrent release.** A device that causes the contactor to open the circuit automatically when the current exceeds the predetermined value at which the release has been adjusted to operate.

NOTE. The preferred term 'overcurrent' is used throughout this standard, but in certain other British Standards to which reference is made, the term 'overload' may be used when referring to these devices (see 7.10.1).

**3.19 inverse time lag overcurrent release.** A device that retards the tripping of the contactor by a time inversely dependent upon the magnitude of the overcurrent.

**3.20 proving making current.** A value of current that the contactor may be called upon occasionally to make under more severe conditions which may occur during its use.

NOTE. The value of this current may be obtained from BS 775:Part 1.

## 4. Service conditions

Control units that are deemed to meet the requirements of this standard are suitable within the limits of their ratings for installations where the service conditions are not more severe than the following:

- (a) *Ambient temperature.* A peak value not exceeding 40 °C with an average value not exceeding 35 °C over 24 h periods. The lower limit of the ambient temperature is - 5 °C.
- (b) *Altitude.* An altitude at the site of installation not exceeding 2000 m (6600 ft) above sea level.

NOTE. These values are based on those given in BS 4752 and BS 4683:Part 1. For installation at higher altitudes, it is necessary to take into account the reduction of the dielectric strength and of the cooling effect of the air. Units so used should be designed or used according to an agreement between the manufacturer and the user.

## 5. Rated values

**5.1 Rated voltage.** The maximum rated operating voltage shall be 1100 V. Standard control units shall be suitable for a voltage variation at least 10 % below and at least 6 % above the declared rated operating voltage.

For dual-voltage units the preferred rated operating voltages shall be 1100 V and 550 V. Other voltages may be used, subject to agreement between the purchaser and manufacturer, and will be deemed to comply with the requirements of this standard, provided that the relevant requirements of all the other clauses are met.

**5.2 Rated frequency.** The standard frequency shall be 50 Hz. Control units designed for other than the standard frequency, within the range of 40 Hz to 62 Hz, provided they satisfy all other requirements specified herein, shall be deemed to comply with the requirements of this standard.

**5.3 Rated thermal load current.** The following continuous load current ratings shall be regarded as the preferred standard:

160 A and 250 A

Units designed for other than these ratings, provided they satisfy all other requirements specified herein, shall be deemed to comply with the requirements of this standard.

**5.4 Rated thermal current of busbars.** The preferred current rating of busbars shall be 300 A. Busbars of other ratings agreed between manufacturer and purchaser shall also be deemed to comply with the requirements of this standard.

## 6. Marking

**6.1 Nameplates.** All control units shall be permanently marked with the requirements of BS 4683:Part 2, and also with the following additional information:

- (a) manufacturer's serial number;
- (b) maximum rated thermal load current, in amperes;
- (c) rated voltage or voltage range;
- (d) frequency;
- (e) where applicable, intrinsic safety certificate details in compliance with the requirements of BS 1259.

## BS 5126:Part 1:1974

**6.2 Terminals.** Terminal markings, if required, for incoming and outgoing connections shall be as agreed between the manufacturer and the purchaser.

**6.3 Busbar interconnecting trunks.** All busbar interconnecting trunks (see 7.3) shall be permanently marked with the following particulars:

- (a) manufacturer's name or trade mark;
- (b) manufacturer's type or reference.

**6.4 Busbar end covers.** All busbar end covers (see 7.4) shall be marked with the following particulars:

- (a) manufacturer's name or trade mark;
- (b) manufacturer's type or reference.

**6.5 Diagrams.** Diagrams of connections shall be provided, taking the form agreed between the purchaser and the supplier.

**6.6 Warning notices.** Any compartment containing live connections which can only be isolated elsewhere shall bear an external warning to that effect.

## 7. Design and construction

A control unit supplied to this standard shall comply with the requirements of BS 4683:Part 2 for Group I enclosures and shall be certified as flameproof, with fittings in accordance with 7.2 to 7.6 inclusive, by the recognised certifying authority. However, control units designed and certified before the date of publication of this standard may have been certified as flameproof to the requirements of BS 229 for Group I gas (methane/firedamp) and such control units which meet the technical requirements of all other clauses stated herein shall be deemed to comply with the requirements of this standard.

Unless otherwise agreed between the manufacturer and the purchaser, no external component shall be made of aluminium, magnesium or titanium, neither shall any alloy containing aluminium and/or magnesium and/or titanium be used unless the total content of these three constituents does not exceed 15 % by mass, and in which the content of magnesium and titanium together does not exceed 10 % by mass. No external part shall be painted or coated with preparations containing (in metallic form) aluminium, magnesium or titanium.

NOTE. These limitations have been imposed to avoid the hazards of incensive sparking due to friction between rusted steel or iron and the metals described.

The following subclauses relate to the basic unit:

- 7.1 Enclosing case
- 7.5 Fittings for outgoing cable
- 7.7 Busbars
- 7.8 Means of isolation
- 7.9 Main contactor
- 7.10.1 Overcurrent protection
- 7.10.2 Undervoltage protection
- 7.11 Control methods
- 7.12 Provision for earthing

The following subclauses relate to optional items:

- 7.2 Fittings for incoming and throughgoing cable
- 7.3 Coupling of units
- 7.4 Busbar end covers
- 7.6 Fittings for auxiliary cables
- 7.10.3 Earth fault protection for main outgoing conductors
- 7.10.4 Earth fault electrical lockout for main outgoing conductors
- 7.10.5 Earth continuity protection
- 7.10.6 Plug electrical interlock
- 7.10.7 Pilot-to-earth fault protection
- 7.13 Instruments
- 7.15 Selection and indication of voltage

The following subclauses relate to both the basic unit and optional items:

- 7.14 Fuses
- 7.16 Temperature limits
- 7.17 Clearances